NPI
Calculatrice en Notation Polonaise Inverse.

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1. http ://www.gnu.org/copyleft/fdl.html

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Chapitre 1

Présentation

1.1 Pourquoi ?

Ce petit logiciel est une calculatrice, pour le shell Unix.
Pourquoi, me direz-vous alors, implémenter une calculatrice pour le shell Unix alors qu'il en existe tant d'autres (bc, ...) ?

Et bien parcequ'elle est en Notation Polonaise Inverse, comme la HP48 !
Dans les années 20, Jan Lukasiewicz a développé un système de logique formelle permettant aux expressions mathématiques d'être indiquées sans parenthèses en plaçant les opérateurs avant (notation de préfixe) ou après (notation de suffixe) les opérandes.
La notation de préfixe est également connue en tant que notation polonaise en l'honneur de Lukasiewicz.
Et la notation de suffixe est nommé notation polonaise inversée (RPN = Reverse Polish Notation) également en l'honneur de Lukasiewicz.

Possédant une HP48GX, j'ai voulu avoir l'équivalent pour le shell Unix. Certe, le projet x48 existait déjà, mais mon idée était d'avoir un outil légé et rapide fonctionnant sur la plupart des plates-formes Unix.

Fonctionnalités :
- Portabilité, robustesse (POSIX) ;
- Simplicité de programmation par le système de pointeur de fonctions ;
- Fonctions de manipulations de la pile ;
- Implémentations des fonctions mathématiques (math.h) ;
- Ajout de fonctions de probabilités ;
- Complétion des commandes.

1.2 Installation

1.2.1 Configuration requise

A l'heure actuelle seule la version Unix (POSIX) est maintenue ;
Testé avec succès sous :
– Debian Woody 3.0r1 (i686, Kernel 2.4.23) ;
– Mandrake 9.1 (i686, Kernel 2.4.21) ;
– Cygwin (sur Win2000) ;
– Sunfire (Sparc 64, Sun Solaris 2.8).

La lib GNU Readline 4.2a (normalement inclus dans la glibc) est requise depuis la version 0.1.4 !

Pour compiler à partir des sources :
– autoconf et autoheader 2.13
– automake 1.4
– make 3.79.1
– gcc 2.95 ou 3.0+

1.2.2 Installation à partir des sources (tarball)

Décompresser les sources avec :

```
~> gzip -dc npi-x.x.x.tar.gz | tar xvf -
```

Puis :

```
~> cd npi-x.x.x
~> ./configure && make
~> su
~> make install
```

Pour lancer npi il suffit alors de taper :

```
~> npi
```

Puis, pour avoir le descriptif des commandes (aide) :

```
 > help
```

Ou, pour avoir la liste des commandes (sur 6 colonnes) :

```
 > ?
```

1.3 Mentions légales

1.3.1 Auteur

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Auteur / concepteur de npi.

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1.3.3 Distribution

http ://freshmeat.net/projects/npi/

1. http ://www.gnu.org/copyleft/gpl.html

Chapitre 2

Notes techniques

2.1 Algorithme

En notation polonaise inverse, chaque opérateur suit ses opérandes ; une expression infixée comme :

```
(1 - 2) * (4 + 5)
```

se note :

```
1 2 - 4 5 + *
```

Il n'y a plus besoin de parenthèses ; Cette notation ne présente pas d'ambiguité, du moment que l'on connait le nombre d'opérandes que nécessite chaque opérateur.

L'implémentation est simple. On place chaque operande sur une pile ; Lorsqu'un opérateur arrive, on dépile le nombre d'opérandes approprié, on leur applique l'opérateur, et on empile le résultat.

Ainsi dans l'exemple ci-dessus, on empile 1 et 2, puis on les remplace par leur différence, -1. Ensuite, on empile 4 et 5, puis on les remplace par leur somme, 9. Enfin on remplace -1 et 9 par leur produit, -9, sur la pile. Lorsqu'on arrive à la fin de la ligne d'entrée, on extrait la valeur qui se trouve au sommet de la pile et on l'affiche.

La structure du programme est donc une boucle qui réalise l'opération appropriée à chacun des opérateurs et opérandes, au fur et à mesure qu'ils apparaissent :

```
tant que (l'operateur ou l'operande suivant
          n'est pas l'indicateur de fin de fichier)
  si (c'est un nombre)
    l'empiler
  sinon, si (c'est un operateur)
    depiler les operandes
    effectuer l'operation
    empiler le resultat
  sinon, si (c'est un caractere de fin de ligne)
    depiler la valeur du sommet et l'afficher
  sinon
    erreur
```

2.2 Implémentation

Quelques détails sur l'implémentation :

- La structure de donnée *Stack* (Pile) a été programmé orienté objet et de façon abstraite ;
- Depuis la version 0.1.4, *npi* utilise intensivement la lib GNU Readline 4.2a (aussi sur ces systèmes, ne possédant pas cette lib de développement, utiliser la version 0.1.3) ;
- L'utilisation de la libreadline a permis la complétion des noms de commandes ainsi que de simplifier l'implémentation des fonctions (utilisation de pointeurs de fonctions).

Chapitre 3

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